Story by Kathy Wythe

# PARTNERING WITH THE MILITARY

*Agriculture uses compost to restore Fort Hood's training lands*

Texas Agricultural Experiment Station researchers have partnered with Fort Hood personnel to identify a natural "weapon" to restore the facility's tank training areas—land and soils seriously eroded, compacted and stripped of the most desirable vegetation by the repeated pounding of 70-ton tanks.

After three years of studies, researchers with the Texas Water Resources Institute (TWRI) in College Station and the Blackland Research and Extension Center (BREC) in Temple have determined that composted dairy manure can increase soil fertility and vegetation cover on some of the Fort's 200,000 acres of training areas and stabilize eroded soils without excessive nutrients entering the streams.

Dr. Bill Fox, TWRI senior research scientist, and Dr. Dennis Hoffman, BREC senior research scientist, the pilot project's co-leaders, and over 20 other scientists and land managers have established more than 500 acres of research and demonstration sites on the fort's primary tank maneuver training area.

"We needed to know that the compost applied on Fort Hood's land is not causing nutrient problems in the water and demonstrate that nutrients in compost can be turned into something positive—growing grass and reducing soil erosion," Fox said.

"We've seen nothing to indicate runoff of nutrients into streams," Hoffman said. Hoffman and his team of researchers monitor the water quality for the project.

The studies also show that research plots with certain rates of compost responded with better vegetation coverage than those without the compost, Fox said.

"After two years of comprehensive work on multiple sites, our research has demonstrated that sites receiving 15 or more cubic yards per acre of compost along with re-seeding treatments have produced significant vegetation increases," Fox said.

The compost not only adds nutrients and organic matter to the training land's soil but it also improves the soil's structure, increases its water-holding capacity and aids in erosion control. To date, the project has trucked in more than 15,000 tons of compost from the North Bosque River Watershed where too much phosphorus from dairy manure runoff is impairing that watershed.

Tanks within two armored divisions at Fort Hood have left some of the training land eroded, compacted and stripped of the most desirable vegetation. Restoration of these lands provides maintenance of quality training lands for military personnel and maintenance and improvement of the natural resources.

"The unique character of this project," said Fox, "is that two major environmental problems are being addressed at the same time. Excessive nutrients in one watershed are being used to fertilize nutrient-starved soil in another. Two 'bads' can make a 'good.'"

Dr. Scott Keating, a TWRI associate research scientist, successfully developed a unique, heavy-duty compost spreader for the project that can handle the rough terrain of the training lands. The stainless steel spreader on a 40-ton axle has an increased capacity and higher discharge rate than other spreaders, Keating said.

"With the gullies caused by erosion and the tracks of heavy military equipment, a standard spreader would not do the job," he said. Keating said there is interest from as far away as Canada about the spreader.

The group compared the percentage of change in ground cover, bare ground and litter (leaves and dead biomass on the ground) over time: 1) at the start of the project, 2) one year after compost was added, and 3) 18 months after compost treatment, which was also after one year of training on the site.

The amount of ground with no vegetation decreased from 50 percent to 32 percent one year after compost treatment and decreased even further to 24 percent 18 months after treatment. Fox attributed this decrease to the litter that remained on the ground after training maneuvers.

The research shows that it takes 12 to 18 months after compost and seed application to achieve significant changes in plant basal cover, Fox said. Preliminary analysis indicates that the treated sites are also more resilient after training exercises than before compost was added.

Along with studying the use of composted dairy manure on the training areas, researchers from the Experiment Station, Fort Hood's Integrated Training Area Management (ITAM), Fort Hood's Directorate of Public Works and U.S. Department of Agriculture-Natural Resources Conservation Service (NRCS) have studied the use of other conservation practices to heal the landscape for 12 years.

Hoffman and his team, working with Jerry Paruzinski of Fort Hood ITAM, and Rob Ziehr from NRCS have installed best management practices (BMPs) such as gully plugs, contour ripping, and sediment retention ponds. Results of water quality studies show that these BMPs play a significant role in reducing sediment loss from training areas into area streams and water bodies.

Their research shows that the ITAM/NRCS conservation practices have reduced stormwater runoff volume and intensity, reduced sediment loss from training areas by as much as 90 percent and improved the training areas' sustainability, Hoffman said.

The compost project, federally funded through the NRCS, is an example of the military's foresight and interest in the environment, saiD U.S. Rep. Chet Edwards, who has supported the program since 2003.

photo by Jerrold Summerlin

"This funding will help Fort Hood avoid environmental problems that could impose restrictions on training—training that is important to saving lives in theater," said Edwards. "Through this innovative program, Fort Hood is once again demonstrating its commitment to environmental stewardship, and by doing so, to the training that keeps our soldiers alive."

U. S. Rep. John Carter agreed. "The Fort Hood Revegetation Project is a necessary tool in enhancing the vegetative growth of the land while improving the training facilities at Fort Hood," Carter said. "This project is another example of the military working to protect the ecosystem surrounding its training areas."

Now the project is moving into its next phase—large-scale application and refining the specific recommendations of using the compost and grasses—and is bringing in two prominent researchers from Texas A&M to help with the project.

"Now that we know compost will not create a water concern, we are integrating this practice into our Critical Area Treatment (CAT) program to sustain training and our natural resources," said Paruzinski of Fort Hood ITAM.

"We will focus on the development of specific strategies for using the compost—how much and when we should use it and with what combination of other conservation practices currently used on the training areas," Fox said.

Dr. Fred Smeins, professor in the Rangeland Ecology and Management Department, will focus on developing better approaches to restoring vegetation on the training lands. Smeins will use a variety of plant materials along with the compost to see which species provide rapid cover for the soil in the training areas.

Dr. Tom Hallmark, professor in the Department of Soil and Crop Sciences, will study the compaction of the soil. "We'll be looking at what changes the plants are making in the soil," Hallmark said. "Some species may be better at relieving compaction than others."

Hoffman, working with others at BREC, NRCS and ITAM, will evaluate the effectiveness of vegetated buffer strips using compost to establish the vegetation along with contour ripping practices currently used.

Fox said the project will "ultimately end up with an integrated maintenance program that will allow Fort Hood to reduce erosion and maintain high quality training grounds."

Steve Burrow, chief of environmental programs, Fort Hood's Directorate of Public Works, agreed, saying the project is vital in providing long-term sustainable training capability for Fort Hood soldiers.

"We can now take what we have learned from this re-vegetation project and implement it into our land management strategy to maximize our resources, both natural resources and financial," Burrow said. "This allows Fort Hood to remain the Army's premier training installation."

"Our CAT program will integrate compost, seeding, ripping, land shaping, gully plugs, tank trail repairs, and rest to rehabilitate the damaged landscape and enhance training capabilities on Fort Hood," Paruzinski said. "Incorporating compost into CAT will increase our land sustainment and enabling training."

For more information on the project, visit: http://forthoodreveg.tamu.edu.

The compost spreader was custom designed and built by Dr. Scott Keating, a TWRI associate research scientist, to handle the rough terrain of Fort Hood's training lands.

Top photo: The heavy artillery traffic from Fort Hood's training leaves ruts and gullies on the land and heavily damages the soil and vegetation.

Bottom photo: A demonstration site treated with composted dairy manure to add organic matter and nutrients and then re-seeded with native grasses flourishes on a portion of Fort Hood's primary training areas.

## Project wins environment award

The Fort Hood Range Revegetation Pilot Project, a joint project of the Texas Water Resources Institute and the Blackland Research and Extension Center, won the 2006 Texas Environmental Excellence Award for Agriculture. The award, sponsored by the Texas Commission on Environmental Quality and Gov. Rick Perry, was presented to the project staff at the agency's banquet in May.

The Texas Legislature created the awards in 1993 and TCEQ presents them to outstanding, innovative environmental programs in 10 diverse categories across the public and private sectors. The Governor's Blue Ribbon Committee, a group of leaders in public and private industry with expertise in environmental policy and practices, judge the applications.

Texas Agricultural Experiment Station Director and Vice Chancellor for Agriculture and Life Sciences Elsa Murano said, "I am so proud of the efforts of the Texas Water Resources Institute with in the Texas A&M Agriculture family for leading the way and being en example to all of us and our great state.

"I am proud of the creativity and drive it takes to develop and carry out a program such as this, which ultimately helps us preserve our precious natural resources for the future."

The Fort Hood project, federally funded through the U. S. Department of Agriculture-Natural Resources Conservation Service, was initiated in 2003 to assist Fort Hood in dealing with soil erosion and land degradation on the fort's training areas.

"As Texans, we understand and appreciate the importance of our state's natural resources," said Kathleen Hartnett White, TCEQ chairman. "These awards recognize the initiative and innovation of Texans who go above and beyond the call of duty to protect and enhance those resources."

U.S. Rep. Chet Edwards, who has supported the program with $2 million in federal funds since 2003, said of the award: "It is a privilege to be part of a program that is a model of collaboration and cooperation that is making a difference for our soldiers and our environment."

U.S. Rep. John Carter gave his congratulations for the award. "I applaud all of the partners in this project and am proud to support practices that will benefit not only Fort Hood's training capabilities, but also the environment," he said.